NAME _____ DATE _____ CLASS _____

ADDITIONAL PRACTICE

1. The longest banana split ever made was 7.32 km long (needless to say, more than one banana was used). If an archer were to shoot an arrow horizontally from the top of Mount Everest, which is located 8848 m above sea level, would the arrow's horizontal displacement be larger than 7.32 km? Assume that the arrow cannot be shot faster than 100.0 m/s, that there is no air resistance, and that the arrow lands at sea level.

2. The world's largest flowerpot is 1.95 m high. If you were to jump horizontally from the top edge of this flowerpot at a speed of 3.0 m/s, what would your landing speed be?

3. The longest stuffed toy ever manufactured is a 420 m snake made by Norwegian children. Suppose a projectile is thrown horizontally from a height half the length of the snake and the projectile's horizontal displacement is as long as the snake. What would be the projectile's initial speed?

4. Libyan basketball player Suleiman Nashnush was the tallest basketball player ever. His height was 2.45 m. Suppose Nashnush throws a basketball horizontally from a level equal to the top of his head. If the speed of the basketball is 12 m/s when it lands, what is the ball's initial speed? (Hint: Consider the components of final velocity.)

5. The longest shot made during a golf tournament was made by Michael Austin in 1974. The ball went a distance of 471 m. Suppose the ball was shot horizontally off a cliff at 80.0 m/s. Calculate the height of the cliff.

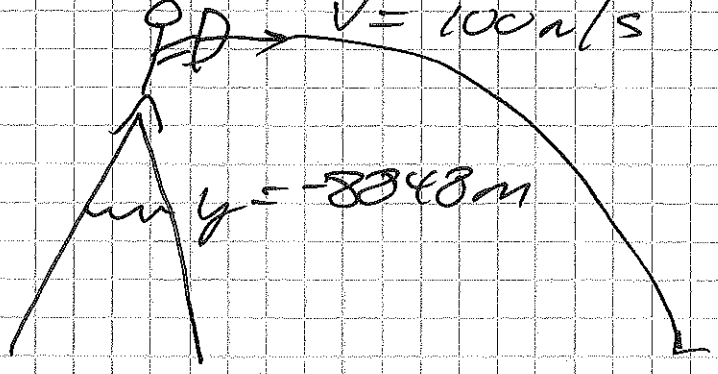
6. Florence Griffith-Joyner of the United States set the women's world record for the 200 m run by running with an average speed of 9.28 m/s. Suppose Griffith-Joyner wants to jump over a river. She runs horizontally from the river's higher bank at 9.28 m/s and lands on the edge of the opposite bank. If the difference in height between the two banks is 2.00 m, with the far bank having the lower height, how wide is the river?

7. Recall Elmer Trett, who in 1994 reached a speed of 372 km/h on his motorcycle. If Trett drives off a horizontal ramp at this speed and lands a horizontal distance of 40.0 m away from the edge of the ramp, what is the height of the ramp? Neglect air resistance.

8. A Snorkel fire engine is designed for putting out fires that are well above street level. The engine has a hydraulic lift that lifts the firefighter and a system that delivers pressurized water to the firefighter. Suppose that the engine cannot move closer than 25 m to a building that has a fire on its eighth floor, which is 25 m above street level. If the horizontal speed of the water emerging from the hose is 15 m/s, how high above the street must the firefighter be lifted in order for the water to reach the fire.

Prob. Set 3D

(1)



X	Y
$V_{ox} = 100$	$V_{oy} = 0$
$a_x = 0$	$a_y = -10$
$x = ?$	$y = -8848$
$t = ?$	$t =$

In the y = $y = V_0 t + \frac{1}{2} a t^2$

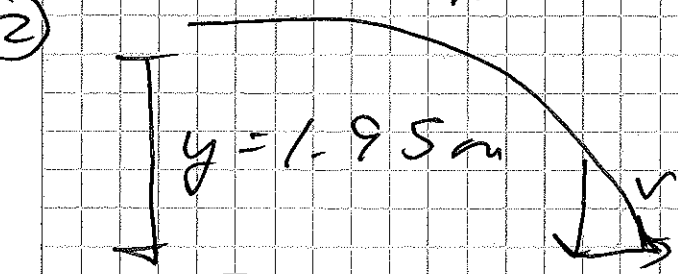
$$-8848 = 0 \cdot t + \frac{1}{2}(-10) t^2$$

$$\sqrt{\frac{-8848 \cdot 2}{-9.8}} = t = 42.5 \text{ sec}$$

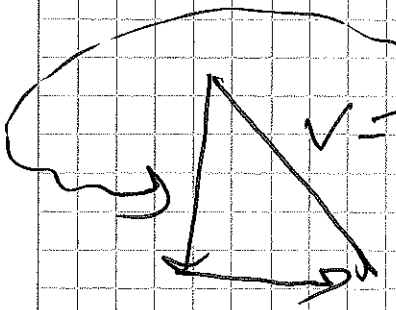
So $x = V_0 t + \frac{1}{2} a t^2$

$x = 100 \cdot 42.5 + 0 =$ **4250 m**

(2)



X	Y
$V_{ox} = 3$	$V_{oy} = 0$
$V_{Fx} = 3$	$V_{Fy} = ?$
$a_x = 0$	$a_y = -9.8$
$x = ?$	$y = -1.95$
$t = ?$	$t = ?$



$V_{Fy}^2 = 0^2 + 2(-9.8)(-1.95)$

$V_{Fy} = 6.18$ m/s

$V = \sqrt{3^2 + 6.18^2} =$ **6.88 m/s**

(3)

$V_0 = ?$

$y = -210\,m$

$x = 420\,m$

SU

$x = V_0 t$

$420\,m = V_{0x} \cdot 6.55$

$\boxed{V_{0x} = 64.2\,m/s}$

X	Y
V_{0x}	$V_{0y} = 0$
$V_f = x$	$V_f = y$
$a_x = 0$	$a_y = -9.8$
$x = 420\,m$	$y = -210\,m$
$t =$	t

$$t = \sqrt{\frac{2y}{g}}$$

$$= 6.55\ sec$$

(4)

V_0

$y = 2.45\,m$

$12\,m/s$

$V_y^2 = V_0^2 + 2ay$

$V = \sqrt{0^2 + 2(-9.8)(-2.45)}$

$V_y = 6.93\,m/s$

Y
$V_{0y} = 0$
$a = -9.8$
$y = -2.45$
$t =$

$$t = \sqrt{\frac{2y}{g}}$$

$t = .707\ sec$

Not Necessary

$6.93\,m/s$

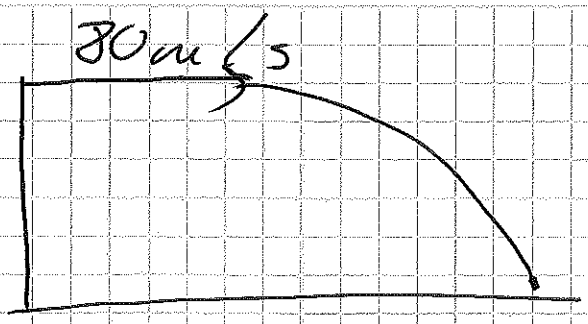
$12\,m/s$

P.T.

V_{0x}

$\boxed{V_{0x} = 9.8\,m/s}$

(5)



$x = 471\,m$

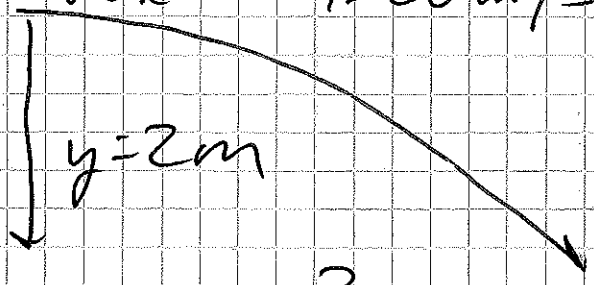
$471\,m = 30\,m/s \cdot t$

X	Y
$V_{ox} = 30$	$V_{oy} = 0$
$V_{1=x} = 30$	$a_y = -9.8$
$a_x = 0$	y
$x = 471\,m$	$t = 5.87\,sec$
$t = ?$	
$t = 5.87\,sec$	

$$y = 0 \cdot t + \frac{1}{2}(-9.8)(5.87)^2$$

$$\boxed{y = -169.85\,m}$$

(6)

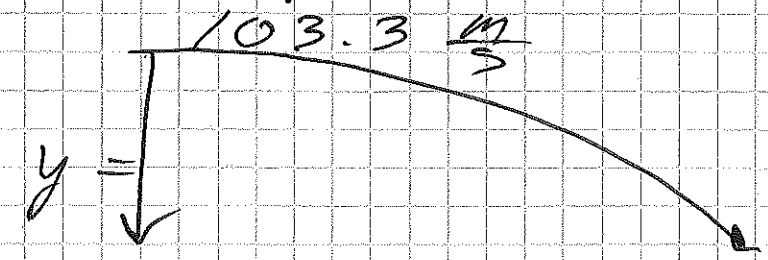


$$y = V_i t + \frac{1}{2} a t^2$$

$$\sqrt{\frac{2y}{g}} = t = .64\,sec$$

$$x = 9.28\,m/s \cdot .64\,sec = \boxed{5.93\,m}$$

(7) $372 \frac{km}{hr} = 103.3 \frac{m}{sec}$



$t \cdot V_{0x} = x$

$t = \frac{V_{0x}}{x}$

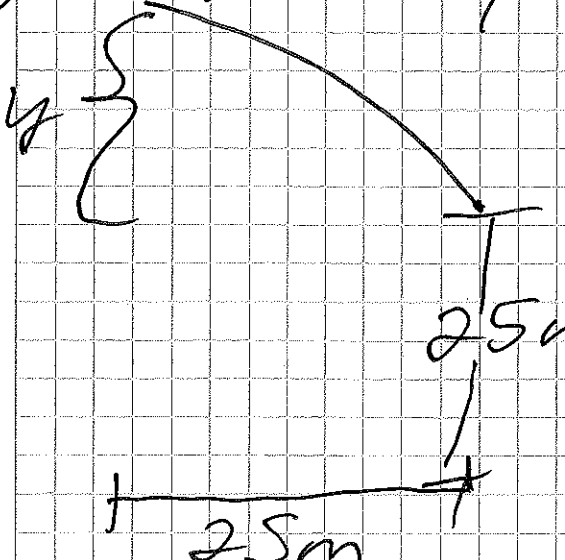
$t = \frac{103.3}{40} = .39 \text{ sec}$

$y = V_0 t + \frac{1}{2} a t^2$

$y = 0 \cdot .39 + \frac{1}{2}(-9.8)(.39)^2$

$\boxed{y = -0.75 m}$

(8)



$x = V_0 t + \frac{1}{2} a t^2$

$25m = 15 m/s \cdot t$

$t = 1.\overline{6} \text{ sec}$

$y = V_0 t + \frac{1}{2} a t^2$

$y = 0 \cdot t + \frac{1}{2}(-9.8)(1.\overline{6})^2$

$y = 13.6 m$

$\boxed{y + 25 = 38.6 m}$